

2.2. Stereo is a driving force

In the early days of stereo experimentation, J.K. Hilliard concluded that even narrow band stereo had far more entertainment value than monaural high fidelity.² Since then, the evolution of multi-channel sound has been relentless. Virtually all entertainment products and services include the stereophonic feature. FM, TV, Hi-Fi's, analog tapes, compact discs, DAT tapes, movies, etc., all provide stereo. Entertainment products and services of the future, such as EDTV and HDTV, not only intend to use stereo, but intend it to be of the highest quality. There is no doubt that this has become a stereo world. To compete for listener's attention without stereo is to accept an unnecessary handicap.

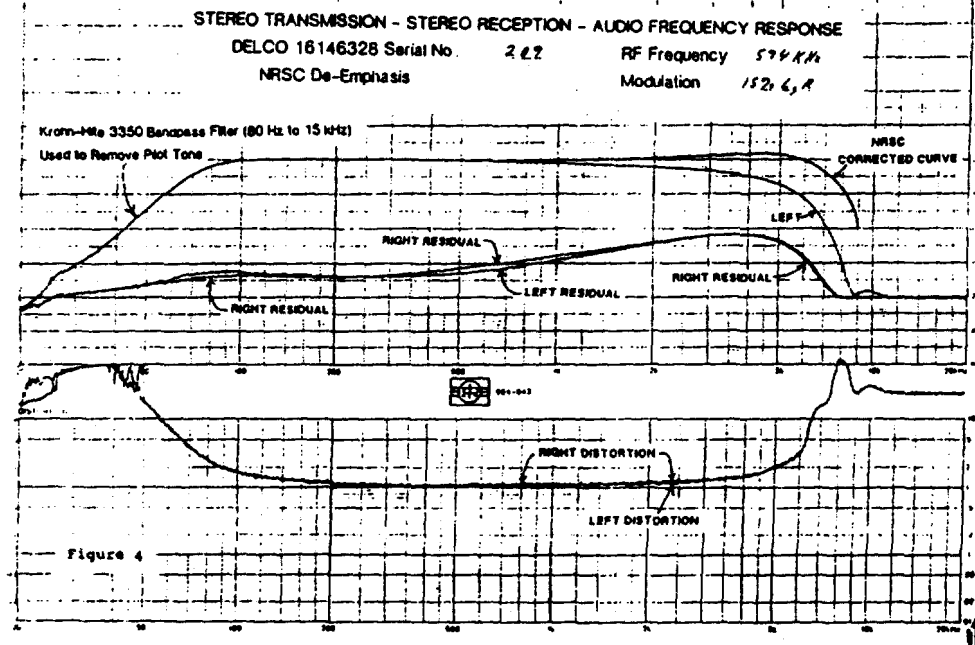
2.3. What kinds of AM radio improvement can be ejected from stereo?

Figure 4 and Figure 5 depict the performance of today that can be expected due to AM Stereo receiver design. These data are abstracted from receivers submitted to Japan's MPT AM Stereo Committee. As can be seen, the auto receiver, which compensates for NRSC pre-emphasis, has an effective 6 dB stereo bandwidth of 7.5-kHz. This effective bandwidth is achieved even though the receiver is specifically designed for the closer, foreign 9 kHz frequency assignments. Separation averages 30 dB. Figure 5, a Hi-Fi type AM Stereo receiver, illustrates an NRSC compensated AM Stereo bandwidth of over 10 kHz and separations greater than 40 dB!

Make no mistake about it, the stereo feature has been the driving force behind these kinds of performance figures.

FIGURE 4 - EXAMPLE OF VERY GOOD FIDELITY AM STEREO AUTO RECEIVER.

AVERAGE SEPARATION 30 dB; DISTORTION 1%; 7.5 kHz RESPONSE.

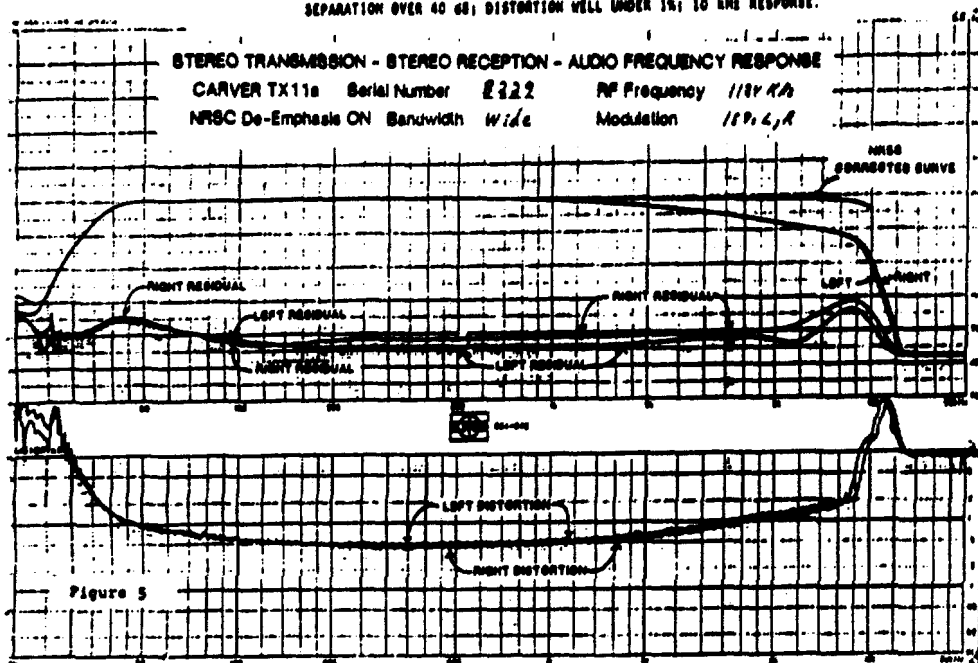


NOTE 1: This is a non U.S. 9 kHz spacing radio.

NOTE 2: Reproduced from test receivers data bank submissions to Japan's MPT.

²Hilliard, J.K. "Audio quality—intermodulation tests" (review of I.R.E. paper) Elect. 19.4 (April, 1946) 218.

FIGURE 5 - EXAMPLE OF HIGH FIDELITY AM STEREO RECEIVER.
SEPARATION OVER 40 dB; DISTORTION WELL UNDER 1%; 10 kHz RESPONSE.



NOTE 1: Reproduced from test receivers data bank submissions to Japan's NPT.

2.4. Why stereo for AM improvement?

It is anticipated that AM Radios may also improve significantly due to the adoption of the NRSC standard de-emphasis and NRSC suggested performance minimums. There is no doubt that these kinds of actions will help. To the listeners, any actions that reduce interference will also improve the perceived quality of the AM service. However, remaining deterrents to wider receiver bandwidths are the effects of broadcast station audio processing techniques and transmitter distortion. Many broadcast stations are adjusted to m loudness while maintaining good sound in a typical narrower bandwidth AM monaural receiver. This makes good sense in view of the nature of their market and the preponderance of narrow band monaural receivers. However, transmissions that may sound good in a typical narrow band mono receiver can sound somewhat distorted to the listener of a wide band or high fidelity receiver.

The situation typically changes for the stereo broadcast. The presence of the stereo pilot tone is a high probability indicator that many quality control steps were taken in the process of station conversion to stereo.

The AM Stereo receiver typically adds an integrated circuit to recognize the pilot tone, validate the signal, and decode the stereo. An IC is necessary because these are a complicated set of functions that would be very high in cost without such a dedicated IC. One truly great benefit about IC's is that once one is committed to a certain set of functions, a little extra silicon to perform even more functions costs very little at the margin. This is why AM receivers can look forward to so many additional features as a result of adding the stereo IC. Furthermore, as additional competition develops and subsequent generations of IC designs are implemented, the function density (features and performance) may be expected to increase and the cost per function to decrease.

3. DETERRENTS TO AM IMPROVEMENTS OFFERED BY STEREO

3.0 General

There have been many deterrents to the growth of AM Stereo. First, the AM broadcasters were steadily losing ground to FM. Reduced revenues were not conducive to investing in a confusing multi-system arena of AM Stereo. Similarly, many receiver manufacturers' profits were less than satisfactory. Hence, there was not a great deal of incentive to add cost to address a multi-system arena. In addition, concern for possible anti-trust violations prevented groups of broadcasters, groups of receiver manufacturers, trade associations, and broadcast equipment manufacturers

from jointly supporting AM Stereo.

TABLE 3.—MAJ

- Justice Department
- Receiver industry
- Groups of receiver manufacturers
- Groups of broadcast stations
- Piece proposition
- ceiver manufacturers
- Multi-system
- C-QUAM, as t
- Broadcast stations
- Foreign receiver
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- Because the i
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- Litigation fear

The real wonder face of these obstacles, and other elements and brought

3.1 Broadcast

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AM Stereo has been percent level. This radio manufacturer the U.S. competitive

Now consider the more than two times radios, such as the types, component and manufacture countries. These are no official government

The Motorola broadcast. But Motorola lack of a standard expenditure when or 60 percent of the 1 to remain competitive 6 for the impact of

from jointly supporting one system or another. Table 3 is a list of some of these deterrents.

TABLE 3.—MARKETPLACE DETERRENTS TO STEREO AM CAUSED SLOW GROWTH

- Justice Department concerns
Receiver industry and broadcast industry trade associations reluctant to adopt an industry standard.
Groups of receiver manufacturers reluctant to jointly support one system.
Groups of broadcasters reluctant to jointly support one system.
- Fierce proponent versus proponent competition—Confused broadcasters and receiver manufacturers.
- Multi-system radio falsely observed as a panacea by some.
- C-QUAM, as the leader, frequently became a target for complaints.
- Broadcast station reluctance to convert without many receivers and types.
- Foreign receiver manufacturers reluctance to participate with non-auto receivers.
- Because the initial choice of a standard was challenged, the FCC became reluctant to continue the standards process.
- Litigation fears.

The real wonder of AM Stereo is that it has progressed as well as it has in the face of these obstacles. Great credit is due to those broadcasters, receiver manufacturers, and other equipment manufacturers who stepped into this forest of impediments and brought AM Stereo to its present stage of development.

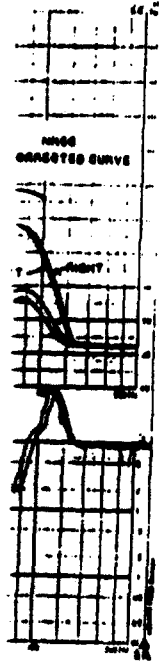
3.1 Broadcaster deterrents

Motorola has been surveying U.S. broadcasters for several years. About 35 to 40 percent of the respondents to the related questions rank lack of a standard and lack of receivers as major reasons for not converting to stereo. These question responses are lumped because it is Motorola's conviction that the lack of non-auto receivers is, to a large part, due to the lack of a standard.

AM Stereo has penetrated the new car auto radio market to a 15 percent to 20 percent level. This penetration by the new service is largely a result of domestic car radio manufacturers setting the pace. Foreign auto radio suppliers have had to meet the U.S. competition.

Now consider the non-auto radio markets, which account for volumes that are more than two times greater than auto radios. The AM Stereo penetration of these radios, such as the personal portables, portables, boom boxes, table/bedroom/kitchen types, component modular systems, Hi-Fi, etc., is almost negligible. But the design and manufacture of the vast majority of these non-auto radios are from foreign countries. These suppliers may be reluctant to invest in a foreign market that has no official government standard.

The Motorola broadcaster surveys also show another factor for non-conversion is cost. But Motorola believes that even this factor is colored to a certain extent by lack of a standard. The lack of a standard makes the investment an "elective" expenditure when only 17 percent of the broadcasters have converted. But, if nearly 60 percent of the broadcasters were converted, as in Australia, the need to convert to remain competitive would become an accepted "must do" expenditure. See Figure 6 for the impact of a stereo standard on Australia commercial broadcasting.



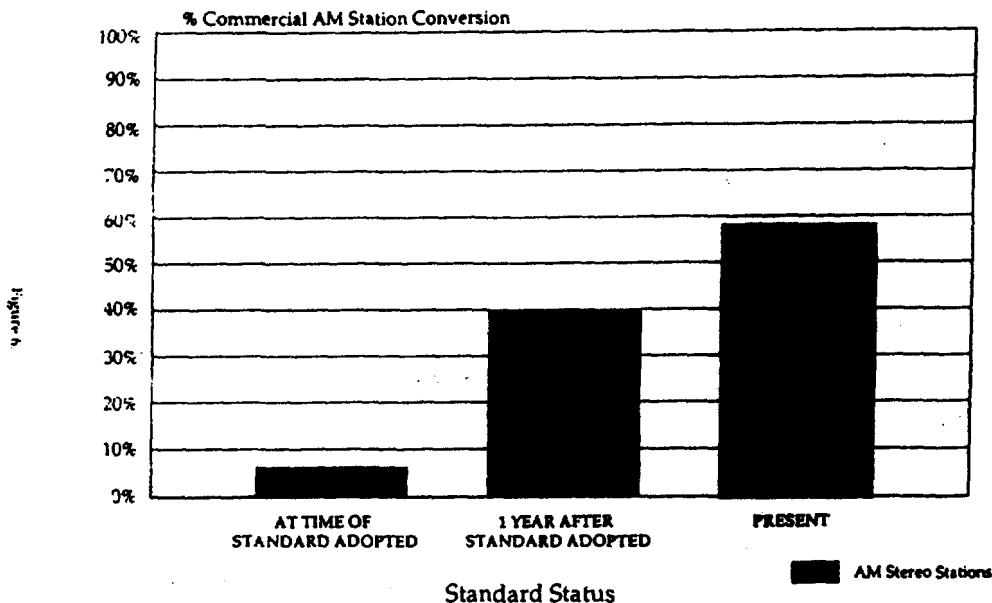
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IMPACT OF STEREO STANDARD ON AUSTRALIA



Note 1: Australia has approximately 139 commercial AM stations.

Note 2: Nearly 60% of commercial AM stations in Australia broadcast in AM Stereo, compared with about 17% in the United States.

3.2. Receiver manufacturers

In Section 1, the status of the progress of the AM Stereo receiver feature was reviewed. About 15 percent to 20 percent of the new automobiles sold in the U.S. have AM Stereo. Section 2 illustrates why AM Stereo results in a host of AM receiver improvements. Still, there has been almost no penetration of AM Stereo into the non-auto radio markets. It was also noted that the vast majority of the design and manufacture of these non-auto products are controlled by foreign interests. In contrast, the auto radio competition is set by U.S. domestic manufacturers; other participants must include the stereo feature to compete. As long as the leading foreign manufacturers do not produce significant numbers of non-auto AM Stereo radios, the other hundreds of manufacturers do not need to offer AM Stereo in order to compete.

When queried, there are "reasons" offered by these manufacturers for non-participation. Among these reasons are:

- There is no market demand.
- Designs will be offered after a market is established.
- At least 1000 broadcast stations are needed to create a receiver market * * * preferably more.

Other comments include the inability to advertise nationally due to limited market and/or difficult advertising constraints.³

Note that the growth rate of TV Stereo, where at least an industry standard exists, has resulted in a penetration of about 40 percent. In addition, based again on our broadcast survey results, the NRSC pre-emphasis industry standard has already been incorporated by the majority of the AM broadcasters. Clearly, these examples show that the impact of a standard, government or industry, is manifest.

Finally, it is worth noting that the domestic auto radio manufacturers moved forward with AM Stereo in spite of all the above cited reasons not to. Many U.S. broadcasters have done likewise. This kind of leadership has always been necessary to establish any new feature or service. But these leaders need help to fully develop AM Stereo. Many more broadcasters and receiver manufacturers must join in. For anyone to say there is no market is a most curious comment. First, there is a very substantial auto radio AM Stereo market. Second, there is never any market until the investments and hard work of the imaginative leaders begin to bear fruit.

³ Manufacturers consider it negative if an advertisement must say or read " * * * This radio only receives the C-QUAM stereo system. * * * There are several other FCC approved systems. * * * " or words to that effect.

4.0 Other AM i

These comments have feature is absolutely r In addition, the stereo direct and by-product ports AM Stereo to th participated in, and h receiver design, stand reduce interference.

4.1 Legislation

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- Broadcaster con manufacturers.

⁴ There is a facetious take away the FM radi scenario is readily rec handicaps of AM radio.

4. CONCLUSIONS AND RECOMMENDATIONS

4.0 Other AM improvements

These comments have focused on AM Stereo because of conviction that the stereo feature is absolutely necessary to even have a chance to compete in today's markets. In addition, the stereo feature results in many broadcast and receiver performance direct and by-product improvements. This is not to imply that Motorola only supports AM Stereo to the exclusion of other AM improvements. Motorola supports, has participated in, and has contributed to industry efforts to improve AM radio through receiver design, standardized pre-emphasis, and standardized emissions masking to reduce interference.

4.1 Legislation considerations

Motorola is generally not supportive of congressional legislation to mandate broadcast standards. Such things are best left to FCC determination. In the absence of a government standard, AM radio need the help of an industry standard, but this possibility has been stymied due to legal concerns of the relevant Trade Associations.

In addition, the chicken and egg of "more receivers<—>more broadcast stations" has been perpetuated and stymied by a lack of stereo non-auto radios. The supply of almost all of these radios is controlled by foreign interests. It is almost certain that these interests have been negatively affected by the lack of a U.S. standard.

Given this unique set of circumstances, it appears that it may be appropriate to search for a path whereby the existing U.S. de facto standard may expediently be recognized.

4.2 An AM stereo standard

In 1982, the FCC took a bold and imaginative step in declaring that the marketplace is the correct forum to establish an AM Stereo broadcast standard. In one sense, that decision was a tremendous success: the marketplace spoke. AM Stereo has continuously evolved to essentially one dominant system.

However, the marketplace dominance of a single system has been insufficient to gain reasonable foreign receiver manufacturer participation to date. This, in turn, has negatively affected broadcaster willingness to invest in stereo. And the resulting circle of slow growth continues.

Given the circumstances surrounding the present status of AM radio, the marketplace has accomplished and is accomplishing all it can do:

- The vast majority of AM Stereo broadcasters are on C-QUAM.
- The vast majority of AM Stereo radios are C-QUAM.

But the growth rate is too slow to greatly have an impact on AM radio needs.

FCC acknowledgment that the marketplace has converged to a single system might accelerate stereo growth for AM radio.⁴ The other approved systems of ten years ago have withdrawn or have decisively lost in the marketplace competition. Should a path be found that leads to the adoption of C-QUAM as the standard, Motorola would take reasonable steps to soften the economic impact on those very few broadcasters who now employ another system and who would have to change.

Motorola is of the conviction that it would be very beneficial to AM Radio if the U.S. de facto standard could somehow become the official national broadcast standard in a decisive, expedient manner. On the other hand, if there is no clear cut and expedient methodology whereby this objective can be achieved, the no action should be taken. At this late date, any long drawn out process or initiation of a normal rulemaking proceeding, would only increase uncertainty and further confuse the broadcasters, the radio manufacturers, and other countries.

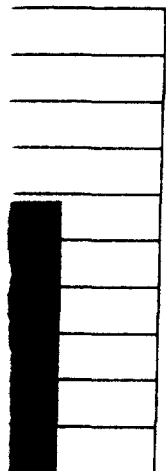
4.3. The future of AM stereo

C-QUAM has become the national broadcast standard in Canada, Mexico, Australia, Brazil, and South Africa. Most recently, Japan has adopted C-QUAM as its standard. It is awkward that this system of choice is not a standard in the country of its birth and development.

No one can predict whether AM Stereo will live or die as a direct result of any present government inaction or action. The past growth has noticeably slowed in recent months. The alarming points of concern that can be made are:

- Broadcaster conversion rates are too slow to meet the needs of foreign receiver manufacturers.

⁴There is a facetious alternative which would also increase AM radio competitiveness. Simply take away the FM radio stereo feature and also significantly limit its bandwidth. This fictitious scenario is readily recognized as a ridiculous step backwards, yet it does describe the market handicaps of AM radio.



AM Stereo Stations

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• Foreign receiver manufacturers have not moved toward AM Stereo in non-auto products. Lack of these receivers impedes the broadcaster conversion rate.

On the world scene, Japan has taken a leadership position and chosen C-QUAM as its national broadcast standard. It is reasonable to expect that other A/P nations will gradually follow Japan's lead. The Asia Pacific region is the most significant source of non-auto receivers to the U.S. market. Once the Asia Pacific market is supplied with AM Stereo radios, there is every reason to hope that the manufacturers will also supply the U.S. market by tacking on additional manufacturing. Hence, thanks to Japan's decision, it may be that the U.S. will eventually receive the quantities of stereo radios necessary to bolster the AM Radio Service. On the other hand, if the Asia Pacific continues its non-US. participation, and the above circle of slowing growth conditions continues, the stereo feature for AM radio will have a very doubtful future.

The Appendix is attached to these comments and its data are offered for the record. Motorola is most appreciative to have this opportunity to share our AM Stereo experience and observations.

C-QI

YEARSTA

1982

1983

1984

1985

1986

1987

1988

1989

1990

1991

APPENDIX

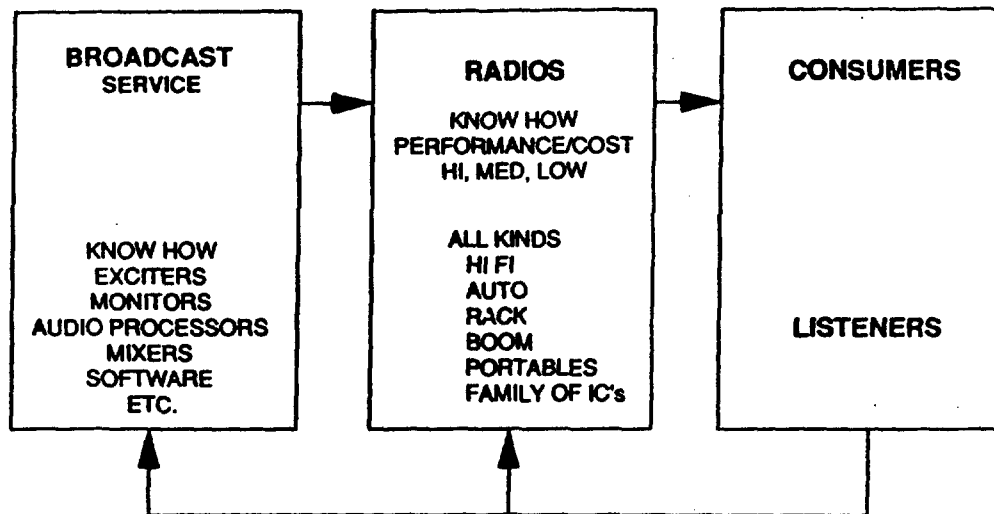
C-QUAM AM STEREO NOTABLE EVENTS

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<u>YEAR</u>	<u>STATIONS ON AIR</u>	<u>NOTABLE EVENTS</u>
1982	2	<ul style="list-style-type: none"> • 1st U.S. installed C-QUAM STATION.
1983	67	<ul style="list-style-type: none"> • 1st Foreign (Canada) installed C-QUAM stations. • Delco and Pioneer C-QUAM auto receivers introduced.
1984	204	<ul style="list-style-type: none"> • 1st Australian C-QUAM.
1985	349	<ul style="list-style-type: none"> • AUSTRALIA ADOPTS C-QUAM. <p>Chrysler, Ford, Nissan, Toyota offer C-QUAM.</p>
1986	485	<ul style="list-style-type: none"> • BRAZIL ADOPTS C-QUAM. <p>Chrysler makes C-QUAM standard in all vehicles that have FM stereo radios.</p> <ul style="list-style-type: none"> • AMC / Jeep, Volkswagen, Mercedes, and Mazda add C-QUAM. • More than 20 C-QUAM aftermarket receivers at Summer CES.
1987	598	<ul style="list-style-type: none"> • CANADA ADOPTS C-QUAM STANDARD. • NTIA recommends C-QUAM pilot tone protection to FCC.
1988	641	<ul style="list-style-type: none"> • FCC COMMISSIONERS DECLARE THAT C-QUAM IS DEFACTO AM STEREO STANDARD.
1989		<ul style="list-style-type: none"> • 1st C-QUAM portable receivers available.
1990		<ul style="list-style-type: none"> • MEXICO ADOPTS C-QUAM STANDARD.
1991	865	<ul style="list-style-type: none"> • JAPAN ADOPTS C-QUAM STANDARD.

A BROADCAST STANDARD IS A "SYSTEM" OF INGREDIENTS



☆ THE LINKS OF THE "CHAIN" REQUIRE ALL OF THE NECESSARY TOOLS TO IMPLEMENT THE SYSTEM.

- STANDARD
- BROADCAST EQUIPMENT
- RADIOS

☆ AM STEREO'S WEAKEST LINK HAS BEEN THE NEED FOR MORE RADIOS.

BROADCAST INDUSTRY—U.S.

- AM market share about 1/3 AM.
- Only about 1/3 AM broadcasters profitable.
- Recessionary for many markets.
- Estimate that 30 percent of those who can afford C-QUAM have it.
- Cost of conversion is a major factor for many.
- Pending new FCC rules had depressing effect due to injection of uncertainty in 1990, 1991. New FCC rules will help, but not quickly.
- Prospect of DAB also having negative effects on conversions.
- Lack of more radios is most often cited as reason for non-conversion.

RECEIVER INDUSTRY—U.S.

- Virtually all non-auto sets imported from A/P.
- Low profits—many participants.
- AM stereo not needed—except defensively. Ergo if leaders do not participate, no one has to.
- Cost reduction pressures.
- The A/P region has chosen to not participate in the U.S. market with non-auto radio AM stereo products.

STANDARDS STATUS SUMMARY

U.S.—De facto standard, >650 stations on air.

Japan—C-QUAM at
Region 1—C-QUAM
France; and Spain, 2.
Region 2—C-QUAM
other South American
Region 3—C-QUAM
clude, Thailand, 12, T

C-QUAM is the ack
FCC AM radio rule
tion of interference st
er quality stations; ex
pre-emphasis standar

- JOKR, JOQR, a1
have equipment insta
- MPT licensing: 1
- Station "proofs":
- On air: 9:00 AM,
- Several addition:

South Africa—Stan
United Kingdom—T
France—Test proce
Spain—Two station

Canada—Standard,
Mexico—Standard,
South America—Br
bia, 1; and Argentina,

Australia—Standar
PRC, 2; and Philippin

INGREDIENTS

Japan—C-QUAM standard, 5.

Region 1—C-QUAM standard in South Africa, 4; test proceedings in U.K. and France; and Spain, 2.

Region 2—C-QUAM standard in Canada, 80, in Mexico, 3, and Brazil, 19; five other South American countries, 11.

Region 3—C-QUAM standard in Australia, 80; others broadcasting C-QUAM include, Thailand, 12, Taiwan, 5, Hong Kong, 3, PRC, 2, and the Philippines.

U.S.A.

C-QUAM is the acknowledged de facto standard, >650 stations.

FCC AM radio rulemaking released—AM stereo made a preference item—Reduction of interference standards and incentives; revitalization through fewer, but higher quality stations; expanded band: higher quality service rules; and NRSC receiver pre-emphasis standards also endorsed by FCC.

JAPAN

• JOKR, JOQR, and JOLF in Tokyo, Manichi Broadcasting and ABC in Osaka have equipment installed.

• MPT licensing: 1/92.

• Station "proofs": 2/92.

• On air: 9:00 AM, 3/15/92!

• Several additional stations expected to join in 2nd quarter.

REGION 1

South Africa—Standard, 4.

United Kingdom—Test proceeding in process.

France—Test proceeding in process.

Spain—Two stations.

REGION 2

Canada—Standard, >80.

Mexico—Standard, 3.

South America—Brazil, standard, 19; Venezuela, 7; Chile, 1; Ecuador, 1; Colombia, 1; and Argentina, 1.

REGION 3

Australia—Standard, >80; Thailand, 12; Taiwan, 5; Hong Kong, 3 (1 pending); PRC, 2; and Philippines, 1 (on air, government standard in progress).

CONSUMERS**LISTENERS****CESSARY****FOR**

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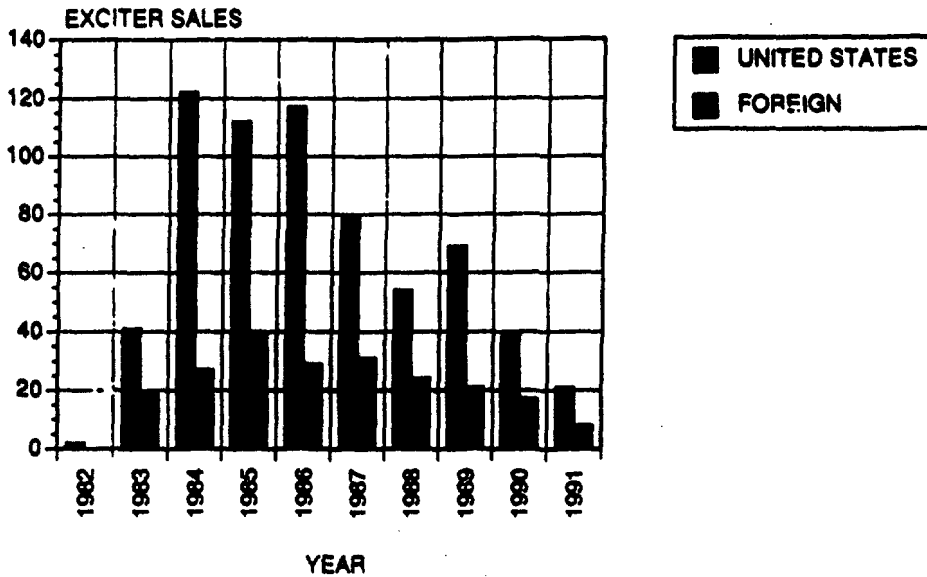
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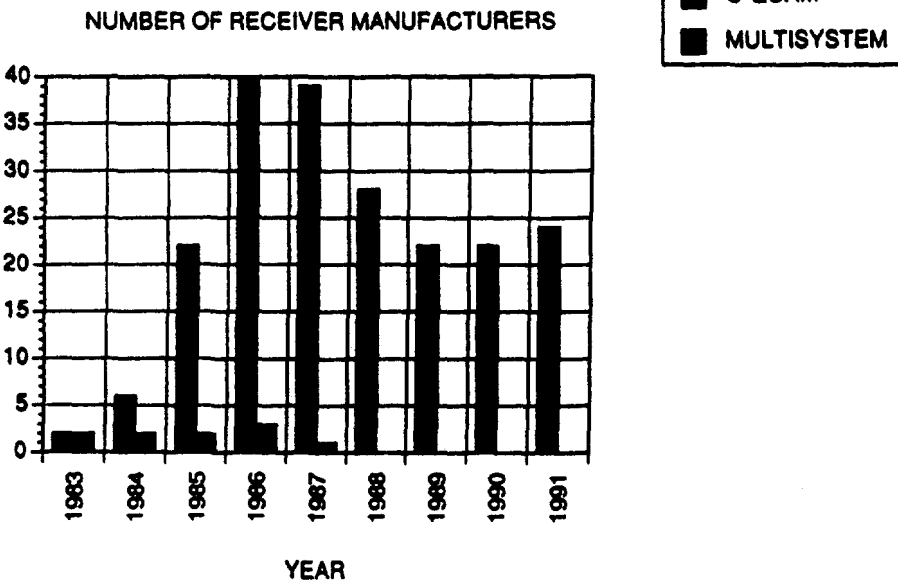
do not participate,

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TOTAL C-QUAM BROADCAST EQUIPMENT SALES PER YEAR UNITED STATES AND FOREIGN



AM STEREO RECEIVER MANUFACTURER PROGRESSION



NOTE 1: While total receivers are increasing about 2 to 4 million sets per year, the number of manufacturing participants is decreasing.

NOTE 2: There are no multisystem AM stereo receivers being manufactured today.

UNITED STATES

ALABAMA

City	Call Sign	Power	City	Call Sign	Power
Athens	WABT	770	El Cerrito		
Asheville	WABC	950	Fresno		
Birmingham	WABC	680	Glendale		
Decatur	WABD	1400	Hayward		
Florence	WBBH	1340	Longmont		
Fort Payne	WPH	1400	Los Angeles		
Gadsden	WABT	930	Los Angeles		
Huntsville	WHP	1230	Los Angeles		
Jacksonville	WABT	810	Los Angeles		
Jasper	WABT	1240	Los Angeles		
Jasper	WBP	1360	Los Angeles		
Mobile	WDX	900	Los Angeles		
Mobile	WJR	960	Los Angeles		
Monticello	WAT	1450	Los Angeles		
Mountain View	WABT	1150	Los Angeles		
Tuscaloosa	WAT	1420	Los Angeles		
Valley Head	WDX	870	Modesto		

ALASKA

City	Call Sign	Power	City	Call Sign	Power
Anchorage	WABT	980	Palmdale		
Juneau	WAT	800	Palmdale		

ARIZONA

City	Call Sign	Power	City	Call Sign	Power
Glendale	WAT	1360	Sacramento		
Flag	WPH	1310	Sacramento		
Phoenix	WDX	960	Sacramento		
Phoenix	WPH	740	Sacramento		
Sedona	WPH	780	San Diego		
Tampa	WPH	1580	San Diego		
Tucson	WPH	1450	San Francisco		
Tucson	WPH	990	San Francisco		

ARIZONA

City	Call Sign	Power	City	Call Sign	Power
Bismarck	WPH	1110	San Jose		
Farmington	WPH	1030	San Jose		
Farmington	WPH	950	San Jose		
Little Rock	WPH	1010	San Jose		

CALIFORNIA

City	Call Sign	Power	City	Call Sign	Power
Bakersfield	WPH	1400	San Jose		
Bakersfield	WPH	950	San Jose		
Bakersfield	WPH	1230	San Jose		
Canyon Country	WPH	1220	San Jose		
Carmel Valley	WPH	540	San Jose		
Catalina Island	WPH	740	San Jose		
Chico	WPH	1200	San Jose		
Costa Mesa	WPH	1430	San Jose		

MOTOROLA

C-CLASS AM STATION LISTING AS OF 9-91

USA 391 AUSTRALIA 75

CANADA 86 OTHER 47

HARRIS PILOT TONE COMPATIBLE 37

TOTAL STATIONS ON THE AIR 836

CORRECTIONS ENCOURAGED
MOTOROLA
1216 REMINGTON RD
SCHAUMBURG, IL 60173
PHONE 708-576-3582
FAX 708-576-5478

UNITED STATES

ALABAMA

Athens WABH 770
Auburn WABG 950
Birmingham WACX 660
Decatur WMD 1400
Florence WBBH 1340
Fort Payne WPPA 1400
Gadsden WABY 930
Huntsville WMBP 1250
Jacksonville WJML 810
Jasper WABF 1240
Jasper WBPB 1360
Mobile WDBK 900
Mobile WJMR 960
Nacole Shoals WJAY 1450
Russellville WJBD 1150
Tuscaloosa WACT 1420
Volley Road WDBK 870

ALASKA

Anchorage KSWB 980
Juneau KJHY 800

ARIZONA

Glendale KJFF 1360
Flag KJMM 1310
Phoenix KXEL 960
Phoenix KPHD 740
Sedona KJUN 780
Tempe KJAM 1580
Tucson KTRK 1450
Tucson KTRK 900

ARKANSAS

Dumont KQBA 1110
Farmingington KFAV 1030
Forth Smith KPSA 950
Little Rock KSLT 1010

CALIFORNIA

Bakersfield KABC 1490
Bakersfield KBLR 950
Bakersfield KZBD 1230
Canyon Country KMET 1220
Carmel Valley KPLP 540
Catalina Island KBBT 760
Chico KMBL 1290
Costa Mesa KJBI 1430

CALIFORNIA (Continued)

El Centro KAMP 1430
Fresno KFRB 960
Glendale KIEV 870
Hesperia KCLZ 540
Hesperia KVAO 910
Lancaster KNL 610
Los Angeles KITS 1150
Los Angeles KOPC 710
Los Angeles KDK 1070
Los Angeles KDSB 1540
Los Angeles KJAC 570
Los Angeles KTHO 1020
Los Angeles KFI 640
Los Angeles KPLB 980
Los Angeles KJLV 950
Los Banos KLSB 1330
Modesto KDKK 970
Modesto KTHB 880
Orange KORT 830
Oxnard KOKR 970
Palmdale KJHY 1470
Palm Springs KDES 920
Pasadena KRLA 1110
Redlands KRL 1410
Riverside KDF 1440
Sacramento KCTC 1320
Sacramento KSMC 1140
Sacramento KTRK 1530
Sacramento KSKC 1240
San Diego KDSB 1170
San Diego KPHB 760
San Francisco KABL 960
San Francisco KQBN 1550
San Francisco KSPB 560
San Francisco KDFY 1050
Santa Barbara KSPB 1400
Santa Barbara KFSB 1340
Santa Barbara KTLN 990
Santa Maria KSDP 660
Santa Maria KSNM 1240
Santa Paula KZTR 1400

COLORADO

Denver KZBN 1430
Denver KJLZ 560
Denver KYPD 950
Denver KJBC 1090
Greeley KATR 1450
Hartsville Springs KTHN 1490
Hortmont KDBE 1040

CONNECTICUT

Puerto Rico KTRN 1390
Bridgeport WICC 800
Danbury WJAB 800
Greenwich WJCH 1400
Hartford WACT 1220
Hartford WDBC 1360
Hartford WVIC 1080
Hartford WHEZ 910
Putnam WJHY 1350
Sharon WJZE 1030
Waterbury WJGB 1590

DELAWARE

Georgetown WBSA 900
Wilmington WJNB 1380
Wilmington WJBL 1130

FLORIDA

Chieftland WJBN 940
Ft. Myers WJBN 1330
Gainesville WJLF 880
Hialeah WJBN 830
Jacksonville WJBU 930
Jacksonville WFTV 1460
Key West WKIZ 1300
Lakeland WJBN 1230
Lehigh Acres WJL 1440
Melbourne WJBL 980
Miami WJBN 580
Miami WJPE 670
Miami WJBN 1210
Miami WJCD 610
Milton WJBY 1330
Ocala WJCP 900
Orlando WJCD 990
Orlando WJTO 540
Palatka WJLC 800
Palatka WJPD 1420
Pensacola WJBN 980
Pensacola WJBE 900
Pine Is. WJCD 1200
Plant City WJLA 910
Port Charlotte WJII 1090
Sarasota WJBN 1280
St. Petersburg WJBN 620
Tampa WJBN 1010
Wildwood WJCF 640
Winter Park WJPE 1440

GEORGIA

Albany WJPC 1450
Albany WJYZ 960
Athens WJPC 960
Athens WJBU 1340
Atlanta WJBN 790
Atlanta WJBN 1190
Atlanta WJBN 750
Atlanta WJBN 990
Augusta WJBC 580
Brunswick WJBG 1440
Columbus WJBN 1460
Columbus WJBN 540
Dalton WJBN 1430
Gainesville WJBN 350
Gainesville WJBN 1340
Lawrence WJBL 610
Macon WJBE 940
Milledgeville WJBN 580
Milledgeville WJBN 1300
Perry WJBN 980
Rome WJBN 1380
Savannah WJBN 1280
Waynes WJBN 1590
Thomasville WJBN 1240
Valdosta WJBN 910
Vienna WJCP 990
Warner Robins WJBN 1230
Waynes WJBN 1230

HAWAII

Hilo KPLA 670
Honolulu KTRK 830
Honolulu KSNB 680

ILLINOIS

Aurora WJBN 1580
Champaign WJBN 1400
Chicago WJBE 830
Chicago WJBN 1390
Chicago WJBN 560
Chicago WJBN 780

ILLINOIS (Continued)

Chicago WJBN 670
Chicago WJBN 720
Chicago WJBN 890
East Peoria WJBL 1290
East St. Louis WJBL 1400
Elmhurst WJBC 1530
Harvard WJBN 1400
LaGrange WJBN 1300
Marion WJBN 810
Metropolis WJBN 920
Paris WJBN 1440
Peoria WJBN 1470
Rockford WJBN 1440
South Beloit WJBN 1380
Springfield WJBN 970
Stirling WJBN 1240
Bloomington WJBN 1370
Columbia WJBN 1010
Evansville WJBN 1280
Ft. Wayne WJBN 1450
Ft. Wayne WJBN 1380
Indianapolis WJBN 1070
Indianapolis WJBN 1430
Indianapolis WJBN 1260
Marion WJBN 810
North Vernon WJBN 1460
Princeton WJBN 1250
South Bend WJBN 960
Burlington KBLR 1440
Cedar Rapids KJBC 1600
Cedar Rapids WJBN 800
Clinton KJBC 1340
Des Moines KJBC 1440
Mason City KJLO 1300
Mason City KJBN 1400
Sioux City KJBL 1470

KANSAS

Ways KAYS 1400
Merhattan KJBN 1350
Wichita KJBI 1070

KENTUCKY

Bowling WJBN 1230

ER YEAR

ED STATES

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NEW SOUTH WALES (continued)

Carbarrs	2CH	666
Carbarrs	2CH	
Coffs Harbour	2CS	639
Cusford	2CO	871
Goulburn	2GH	1368
Kempsey	2KC	531
Lismore	2LM	900
Murrumbidgee	2MU	972
Newcastle	2ND	1143
New Castle	2NC	1233
Newcastle	2ND	1413
Newcastle West	2NW	1341
North Island	2NI	1566
North Sydney	2NS	1269
Sydney	2BL	702
Sydney	2CH	1170
Sydney	2GB	873
Sydney	2GT	1017
Sydney	2UE	954
Sydney	2UM	1107
Sydney	2UE	1224
Wagga Wagga	2WG	1152
Wollongong	2WO	1575
Wollongong	2WL	1314

NORTHWEST TERRITORY

Garvin	8DN	1262
Garvin	8DR	657

QUEENSLAND

Ayr	4AY	936
Brisbane	4BC	1116
Brisbane	410	1008
Brisbane	4BD	695
Brisbane	4BN	882
Brisbane	4BK	1296
Brisbane	4BU	1332
Brisbane	4BR	612
Cairns	4CA	866
Gladstone	4GC	927
Gympie	4GY	358
Herbston	4HS	828
Oakey	4OK	1262
Rockhampton	4RO	990
Southport	4SG	1197
Toowoomba	4OR	864
Townsville	4TO	776

SOUTH AUSTRALIA

Adelaide	5AD	1323
Adelaide	5AW	891
Adelaide	5DN	972
Adelaide	5CA	1197
Barrow	5BW	1595

TASMANIA

Robert	7HO	864
Robert	7HT	1080
Robert	7DR	956
Launceston	7LA	1098

VICTORIA

Bellart	3BA	1314
Bendigo	3BD	945
Melbourne	3AC	1303
Melbourne	3AU	1278
Melbourne	3OB	1026
Melbourne	3OC	1179
Melbourne	3LO	776
Melbourne	3LF	927
Melbourne	3KY	1422
Hornington	3HP	1377
Sale	3SR	1242
Shepparton	3SR	1260
Marmambool	3LA	531

WEST AUSTRALIA

Perth	6AX	1080
Perth	6KY	1206
Perth	6PH	990
Perth	6PR	882
Perth	6AF	720

SOUTH AFRICA

Radio 540	Bophuthatsane	540
Radio 702	Johannesburg	702
Radio 5	Johannesburg-2	576
Radio OXK		1080

VENEZUELA

Radio Capital-Caracas	710
Radio Metropolitana	1500
Exito	1502
Radio Exito	1500
Radio Caracas	1500
Tunero	1500
Radio Barinas	1500

BRAZIL

Fort Alencar	Radio Jorai	1080
Goiania	Radio Arhangels	1230
Juazeiro	276039	1180
Radio Alvorada	276407 Line	1080
Maraca	276286	1230
Maracana	Radio Cidade	860
Maracana	Radio Cidade Imperial	610
Ponta Grossa	Radio Clube	1080
Rio de Janeiro	Radio Nacional	860

BRAZIL (continued)

Polonia	Radio Contin.	570
Rio de Janeiro	Radio Jornal	960
	Radio Inconfidencia	980
Sao Paulo	276886	1340
Sao Paulo		1150
	Radio Gaucha	1120
Porto Alegre	Radio Guizos	720
Brasilia	Radio Braz	980
Rio de Janeiro	Radio Marchete	760
Sao Paulo	Radio Guajara	1270

CHINA

Nanchang	Radio Zhejiang	1530
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SPAIN

Madrid	Radio Popular	999
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CHILE

Santiago	Radio Diego Portales	1180
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GUATEMALA

Guatemala	Radio La Prensa	770
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HONDURAS

Tegucigalpa	NEPR	570
Tegucigalpa	NEPR	1000
Tegucigalpa	NEPR	960

S.L.C.

Kashung		864
Telcel	BCC	857
Telcel	ICRT	567
Telcel		720

PARAGUAY

Asuncion	MCB	710
Asuncion	MCB	1560
Asuncion	MCB	1490

HONG KONG

Radio V Red		738
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THAILAND

RCOT		1143
RCOT		1406
RD		738
RSAT		1062

COLOMBIA

Bogota	RAJO	770
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